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ABSTRACT

The relationship between achievement test performance and two variables associated with test taking were studied. The variables were the order in which the students completed the test and the time students required for completion. Recent research had been mixed concerning whether high achievers would complete tests faster. The study was conducted to resolve the contradictions of earlier research and to extend the range of inquiry from performance on a single test to performance on several exams through a course. Performance data were obtained from college students. Statistical analyses indicated no linear or curvilinear relationships between rank or time and performance on individual tests. The average scores of those finishing in the first quartile were not significantly different from the last three. Results of the study did not seem to find exam-taking speed as a variable related to test performance. Student test performance in this study could not be predicted by the amount of time required to complete an examination, nor by the relative order in which a student completed the exam. The results suggested students should be given ample time to complete exams, as speed of response is not a primary objective in most college courses. (DWH)

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Order of Finish, Time to Completion, and Performance on Course-Based Objective Examinations: A Systematic Analysis of Their Relationship on Both Individual Exam Scores and Total Score Across Three Exams

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Abstract

There is growing interest in the relationship between achievement test performance and two variables associated with test taking: the order (rank) in which students complete the test, and the time students require for completion. Intuitively it would seem that higher achievers would complete achievement tests faster than lower achievers. Recent research evidence is mixed. Some researchers found such a relationship, although slight, while others found none. This research was undertaken to resolve the contradictions found in earlier research and to extend the range of inquiry from performance on a single exam to performance on several exams through a course. Performance data was obtained from 278 college students on three course-based objective examinations. Analyses showed no linear or curvilinear relationships between rank or time on performance on individual tests. Similarly there was no relationship between average rank or time over three tests and total score. The average score of those finishing in the first quartile were not significantly different than the last three. It appears that exam-taking speed (in terms of rank and time to completion) is not among the variables related to test performance.

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Running head: Order of Finish

The literature indicates a growing interest in the relationship between achievement test performance and two variables often noted by those administering the test, i.e., the order in which students complete the test (rank) and the amount of time students require to complete the test. As Paul and Rosenkoetter (1980) suggested, it would seem that better students finish soon[er]. However, the research evidence is at best mixed, with the added complication that many writers (e.g., Burack, 1967; Ebel, 1972; Michael & Michael, 1969) overlook the distinction between time and rank and use the terms interchangeably.

What follows is a brief summary of the literature on rank and performance. Burack (1967) and Ebel (1972, p. 108) found no relationship between rank and course examination scores. However, Michael and Michael (1969) did find a significant curvilinear relationship between level of performance and order of completion. Johnson (1977) found significant differences between the variances of students finishing early, late, or in the middle. He concluded that early and late finishers include both very high and very low scores, whereas students finishing in the middle have moderate scores. The work of Paul and Rosenkoetter (1980) found no support for Johnson's findings. However, they speculated from their own observations that there is a tendency for better students to finish early on tests as there was a trend for the first quartile group (in order of completion) to have higher mean scores.

Despite numerous references to time in most research, only Terranova (1972) investigated the relationship between time to completion and

performance on an objective test. No significant linear relationships were found, but significant curvilinear regressions of time on score were found in support of the findings reported by Michael and Michael (1969). In all of the previously cited research, conclusions were based on the responses to a single exam.

This author's purpose in conducting this research is twofold: 1) to resolve some of the contradictions raised in earlier research; and 2) to extend the range of findings from performance on a single exam to performance through a course. Specifically, the data generated in this research will be examined for evidence of linear and curvilinear relationships on individual tests as well as across three tests. The data will also be used to determine the consistency of order of finish and time over three tests, and Paul and Rosenkoetter's (1980) claim that better students finish in the first quartile (in terms of order of finish).

Method

Subjects. Performance data was obtained from 278 freshmen and sophomore students enrolled in five sections of introductory psychology at The Pennsylvania State University.

Procedure. The rank and time to completion for each student was recorded upon completion of a course-based multiple-choice exam. Students were instructed to turn in their papers upon completion and were provided as much time as they required to complete their exams. This was done on

each of three exams per student over the course of a ten-week school term. Grading was based on the total score for three exams.

Results

In order to determine if there was a linear relationship between order of completion and raw test score 15 Pearson rs (three exams in each of five sections) were computed. As indicated in Table 1, only one of the 15 was significant at the .05 level. Similarly, 15 Pearson rs were computed to determine the relationship between time to completion and raw test score. Only one of 15 was significant at the .05 level. See Table 2. Sex differences were negligible.

Insert Table 1 about here

Insert Table 2 about here

Fifteen Spearman rs were computed to determine the relationship between order of completion and test scores ranked. Only one of 15 was significant at the .05 level. The values are presented in Table 3. Additionally, Spearman rs were computed to determine the relationship between time to completion and test score ranked. As indicated in Table 4, only one of 15 was significant at the .05 level. Again, sex differences were negligible.

Insert Table 3 about here

Insert Table 4 about here

The number of significant linear correlations is almost at the chance level, and those that are have relatively low coefficients. It can be concluded that there is little, if any, linear relationship between order of completion and score and time to completion and score on individual tests. As a final test for a linear relationship, Pearson rs were computed to determine the relationship between the average order of finish over three tests and total score. In none of the five sections were the coefficients significant. See Table 5 for the calculational values. Similarly, as indicated in Table 6, there were no significant Pearson rs for average time over three tests and total score.

Insert Table 5 about here

Insert Table 6 about here

The lack of a significant linear relationship with average rank and average time was not surprising, as there were few on individual tests, and students' order of completion and time to completion remained fairly consistent. See Tables 7 and 8.

Insert Table 7 about here

Insert Table 8 about here

The data was next examined for curvilinear relationships. Michael and Michael (1969) and Terranova (1972) found some evidence of a curvilinear relationship, with better students finishing in the middle third. However, in the five sections tested in this study, there was no support for this conclusion. A drawing of scatterplots showing the regression of performance upon order of completion showed no consistent patterns or relationships. Further, students were grouped according to whether they were among the first, second, or last third of the examinees to return their exams, following the procedure of Michael and Michael (1969) and Terranova (1972). Of 15 such groupings, only three showed the middle group to have the highest mean score, with the first third the highest in eight cases, and the last third the highest in four cases. While this may show a slight trend in favor of the first finishing group, a one-way analysis of variance, as shown in Table 9, reveals that only one of the groupings had any significant differences.

Insert Table 9 about here

In order to test Paul and Rosenkoetter's (1980) claim that there is a trend for better students to finish early, each section was divided into quartiles according to order of completion. The test score mean and variance were computed for each quartile. As indicated in Table 10, a one-way analysis of variance performed on the data shows only one of 15 significant at the .05 level. However, in eight of 15 cases, the first quartile score was highest. The first quartile group showed a trend toward the highest scores, but it was not statistically significant. Thus, the differences were slight.

Insert Table 10 about here

Discussion

In attempting to better understand test-taking behavior, researchers have investigated a number of variables related to test performance. For example, anxiety (Samuel, 1981, p. 289), attribution (Arkin & Maruyama, 1979) and student misconceptions held at the beginning of a course (Gutman, 1979) have all been found to be directly related to test performance. However, it appears that exam-taking speed (independent of other factors) in terms of order of finish and time to completion is not among those variables related to performance. In the five class sections reported on in this study, student performance could not be predicted by how much time was required to complete an

examination, nor could it be predicted by the relative order in which a student completed the exam. Further, as speed of response is not a primary objective in most college courses (Ebel, 1972), these results suggest that students be given ample time to complete exams.

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Table 1

Pearson *rs* Between Order of Completion and Raw Test Score

	Section	*n*	*r*
Test 1	1	44	.10
	2	41	.03
	3	62	.13
	4	45	-.11
	5	50	-.13
Test 2	1	43	-.12
	2	54	-.06
	3	63	.04
	4	44	-.19
	5	45	-.32*
Test 3	1	30	.17
	2	54	.08
	3	48	.06
	4	45	.08
	5	46	-.08

* $p < .05$

Table 2

Pearson *rs* Between Time to Completion and Raw Test Score

	Section	*n*	*r*
Test 1	1	44	.17
	2	41	.09
	3	62	.15
	4	45	-.11
	5	50	-.11
Test 2	1	43	-.11
	2	54	-.01
	3	63	.05
	4	44	-.26
	5	45	-.31*
Test 3	1	30	.23
	2	54	.12
	3	48	.19
	4	45	.08
	5	46	-.07

* $p < .05$

Table 3

Spearman rs Between Order of Completion and Test Scores Ranked

	Section	n	r
Test 1	1	44	.12
	2	41	.02
	3	62	.09
	4	45	-.12
	5	50	-.08
Test 2	1	43	-.08
	2	54	-.07
	3	63	.02
	4	44	-.20
	5	45	-.29*
Test 3	1	30	.18
	2	54	.07
	3	48	.02
	4	45	.08
	5	46	.01

* $p < .05$

Table 4

Spearman *rs* Between Time to Completion and Test Scores Ranked

	Section	*n*	*r*
Test 1	1	44	.19
	2	41	.09
	3	62	.12
	4	45	-.12
	5	50	-.06
Test 2	1	43	-.08
	2	54	-.03
	3	63	.04
	4	54	-.26
	5	45	-.30*
Test 3	1	30	.21
	2	54	.12
	3	48	.07
	4	45	.08
	5	46	.03

* $p < .05$

Table 5

Pearson rs Between Average Order of Completion

Over Three Tests and Total Score Unranked

Section	n	r
1	27	.01
2	48	-.06
3	41	.14
4	39	-.05
5	42	-.16

Table 6

Pearson rs Between Average Time to Completion

Over Three Tests and Total Score Unranked

Section	n	r
1	27	.11
2	48	.02
3	41	.16
4	39	-.06
5	42	-.12

Table 7

Correlation of Order of Finish Across Three Tests

Section	r Test 1-2	r Test 2-3	r Test 1-3
1	.57	.84	.71
2	.85	.85	.83
3	.64	.40	.48
4	.85	.52	.56
5	.58	.61	.54

Table 8

Correlation of Time to Completion Across Three Tests

Section	r Test 1-2	r Test 2-3	r Test 1-3
1	.67	.88	.79
2	.80	.89	.79
3	.69	.42	.45
4	.84	.45	.58
5	.61	.63	.53

Table 9

Analysis of Variance of Mean Scores of First, Second, and Last Thirds Based on Order of Completion

	Section	n	f
Test 1	1	43	1.30
	2	44	5.36*
	3	63	2.28
	4	46	1.86
	5	51	.61
Test 2	1	44	1.51
	2	55	.26
	3	64	.46
	4	45	.95
	5	46	1.16
Test 3	1	29	.04
	2	53	1.26
	3	49	.02
	4	46	.65
	5	47	.53

* $p < .05$

Table 10

Analysis of Variance of Quartile Means

Based on Order of Completion

	Section	n	f
Test 1	1	43	1.18
	2	44	2.66
	3	63	1.13
	4	46	1.96
	5	51	.97
Test 2	1	44	4.89*
	2	55	.42
	3	64	.21
	4	45	1.49
	5	46	1.70
Test 3	1	29	.01
	2	53	1.80
	3	49	.33
	4	46	.17
	5	47	.48

* $p < .05$